THE

Malayan Agricultural Journal.

FEBRUARY, 1938.

EDITORIAL.

Small-Scale Palm Oil Production.

In a recent number of this Journal* we discussed the advance which has been made during the past few years in the sphere of engineering in connexion with palm oil production. We stated that the early view was that the economic unit to plant was a very considerable area because the machinery for extracting the oil was large and expensive, but that machinery is now available to suit the requirements of almost any area above 200 acres.

In the present number of this Journal we publish a discussion on the possibility of producing palm oil on small holdings of about 20 acres. Messrs. Milsum and Georgi, who were responsible for this investigation, discuss the subject from the point of view of production of oil. They employed a type of hand-press which has been evolved for use in Nigeria and produce data concerning the efficiency of this press under local conditions. The authors conclude that the small hand-press, with careful working, is capable of producing an oil equal in quality to the oil at present obtained on Malayan plantations. Although a high-quality oil can be assured, producers cannot expect an oil recovery of more than 70 per cent. as compared with 90 per cent. on estates.

We consider the assurance that high-quality oil can be produced under small-holding conditions as of paramount importance, for had it been otherwise, the production of palm oil under these conditions would have presented grave difficulties in marketing, particularly in the early stages of development as a small-scale industry. Furthermore, it is desirable to maintain Malaya's reputation for a high-quality palm oil suitable for edible and other special purposes.

The fact that small-scale production results in the recovery of only 70 per cent. of the oil content is unlikely seriously to discourage planting on small holdings as the economics of production on small holdings are not viewed in the same light as by owners of large estates. It is always possible, too, that further improvements may be made either in the perfecting of machinery or in the process of extraction, which will result in a greater oil recovery.

While, therefore, we are satisfied that the production of palm oil of good quality is possible on small holdings, the disposal of the crop presents difficulties, especially in the initial stages of a small-holding industry. One or two planters of

* *Malayan Agricultural Journal*, Vol. XXV No. 11, November, 1937.

a few acres of oil palms have recently asked the advice of the Department of Agriculture regarding the sale of their produce. In each case we have advised our enquirers to seek an arrangement for sale to near-by large estates, but we are at present unaware whether estates are prepared to consider any great development of this system. Shipments are rarely effected for a smaller quantity than 5 ton lots, a quantity which would normally be beyond the scope of the small-holder.

The establishment of palm oil production on small holdings will be rendered easy if a number of such holdings are developed in the same district. These areas need not be contiguous, but sufficiently near to render possible concerted action for the sale of oil and kernels. Oil bulked from such producers could be sold through the present channels without difficulty.

The successful development of a combine of owners of small areas in one district would doubtless lead to similar developments in other areas and might therefore result ultimately in a valuable addition to the crops considered suitable for cultivation on small areas in Malaya.

Yield of Arecanuts.

The arecanut industry in Malaya is of considerable importance, as can be proved by the official figures of net exports. In 1936, for instance, the net exports exceeded 26,500 tons, valued at over 3¼ million dollars. The total area under the crop is 50,000 acres, of which 35,000 acres are situated in Johore and about 6,000 acres in Kelantan. The industry is therefore of particular importance in these two States, but it is also considered a welcome money-producing crop to Asiatic small-holders throughout the country.

We have always considered that arecanuts warranted serious consideration as a crop for large-scale cultivation, but data concerning varieties, their behaviour under varying soil and other conditions, the economic life of the plantation, and the yields that might be expected have been so meagre and unreliable that it has been impossible to advance a case in favour of such development of the industry.

While personal observation may assist a determination of the approximate conditions under which the palm should be cultivated, and its economic life, the present conditions under which it is grown and harvested preclude anything but an estimate of yield, and such estimates as have been determined by various observers have varied so widely that it has been impossible to use the figures as a basis for making estimates of probable production costs.

Mr. J. N. Milsum publishes the first reliable data we have seen on yields in Malaya. Admittedly, the conditions under which the palms were grown were not those met with on a plantation, but the author compares the yields of varieties grown under similar conditions. The investigation is particularly useful for this examination of varieties, but we desire to emphasise that his suggested yield under plantation conditions of from 10 to 15 piculs (1,300 to 2,000 lbs.) per acre is merely an estimate and is therefore offered with reservations.

Original Articles.

SMALL SCALE EXTRACTION OF PALM OIL

BY
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and
C. D. V. GEORGI,
Senior Chemist.

Introductory.

The oil palm, which is an introduction to Malaya, has generally been regarded as a crop more suited to estate cultivation than to the small-holder.

This is partly due to the fact that as a result of stressing the importance of quality of product, particularly the oil, a well-equipped factory has rather come to be regarded as an essential for the extraction of palm oil and palm kernels. The outlay necessary for such a factory is far beyond the reach of the small-holder.

Another and possibly a more cogent reason is to be found in the absence of any enthusiasm on the part of the native population to adopt palm oil in preference to coconut oil for household purposes.

Since external markets had therefore to be sought for both products it has always been felt that a small-holder would have considerable difficulty in disposing of his produce in the absence of any central organization prepared to purchase small quantities of oil or kernels. Further, until the introduction of the steel drum a few years ago as the general method of packing for small quantities of oil, the assembling and the use of the light wooden barrel, which required careful handling to avoid leakage, would have been an added disadvantage from the point of view of the small-holder.

As regards quality of products, the small-holder can extract both palm oil and palm kernels of a quality equal to those produced on estates, provided the principles underlying the preparation of high-quality products are followed. This was clearly shown in the early days of the industry when estates with improvised hand-operated plant easily maintained a quality of oil equal to the present estate standard.

From the point of view of the estate, the disadvantage of this system was the amount of labour required; in the case of the small-holder this would not apply, seeing that he works for himself and has no overhead charges to meet.

In Nigeria, where the production of palm oil is a native industry, several years of continuous study by the Department of Agriculture of that country of many types of press and of extraction processes resulted in the evolution of the press and the process described below. This press-process is now being widely adopted in Nigeria in place of the old native methods.

The presses, which are manufactured by Duchscher & Co., Wecker, Luxemburg, are available in various sizes, the most popular being known as N.G. No. 1 type, holding about 150 lbs. of fruit. One of these presses was imported from England last year and installed at the Central Experiment Station, Serdang, for trial with local fruit.

Description of Press.

The press consists of a cage composed of strips of seasoned oak, arranged longitudinally and hooped with two iron bands. The cage, which is 20 inches in diameter and 20 inches high, is made in two halves, which are bolted together. This arrangement ensures rapid emptying of the cage on completion of a pressing.

Pressure is applied by means of a ram working on a screw. The upper part of the ram terminates in a crosshead into which two levers are fixed to actuate the ram.

The press rests on a solid iron base, which can be bolted down.

A wooden false bottom is provided for the cage, also covering beams for inserting above the charge of fruit. The beams tend to ensure an even distribution of pressure on the mass while being pressed. Both the false bottom and the covering beams are made of seasoned oak.

The general arrangement of the press is shown in the accompanying photograph.

Method of Working.

The following is a description of the extraction process which, apart from one or two slight modifications, follows standard Nigerian practice.

1. *Sterilization of Fruit.*—Loose fruit, 150 lbs. in weight, is placed in a wire cage fitting into a 40 gallon oil drum, half filled with hot water. The cage can be raised or lowered by means of a block and tackle. The fruit is allowed to simmer for between 5 and 6 hours, after which time the pericarp is sufficiently soft to be detached from the nuts on pounding.

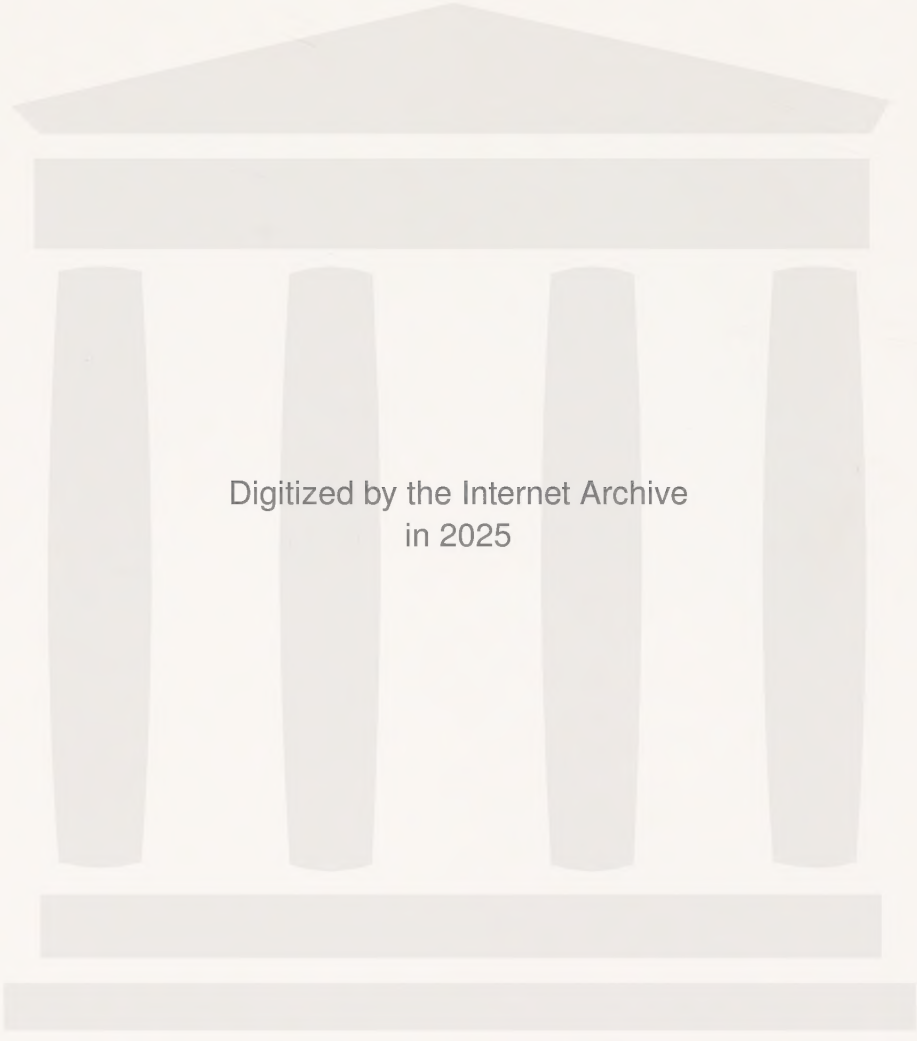
Three of these oil drums are set in a row over a roughly constructed fireplace to ensure a plentiful supply of fruit for pressing.

2. *Mashing of Fruit.*—The charge of fruit is withdrawn and divided equally between two small oil drums. The fruit is then pounded with a wooden pestle. The latter must be provided with a large head to ensure satisfactory pounding.

Experience shows that mashing of the fruit is the most important part of the whole process. The large proportion of pericarp in the Deli type of fruit necessitates pounding for between 10 and 15 minutes before the fruit is completely disintegrated.

With mixed fruit, it is noticed that a proportion of the small individual fruits escapes pounding; they appear to remain in suspension in the mash. For this reason it is recommended to screen the loose fruit before treatment to exclude any obviously undeveloped fruits.

Hand Press for Palm Oil Extraction.



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3. *First Pressing.*—The cage is charged with the hot mash and the pressure applied slowly to prevent an excess of mucilaginous matter or sludge exuding with the oil. Two men are sufficient to work the press, gradually applying as much pressure as the machine can exert. There is no danger of cracking the nuts owing to the high proportion of pericarp in the fruit. The crude oil is collected in a 4 gallon kerosene tin placed below the outlet from the press.

A slow application of pressure is an essential for this stage of process. If more than two men are set to work the press the oil will be found to contain a much greater proportion of sludge, while in addition the crosshead levers may be bent.

4. *Separation of Nuts and Pericarp Residue.*—The pressure is released, the cage opened and the cake of nuts and pericarp residue removed. The latter must be separated by hand picking. The time required for this operation can be reduced by arranging a sloping surface of boards at an angle of about 30°. Small quantities of the material are placed at the top of the slope and agitated by means of a short length of board. Provided the sterilized fruit has been pounded satisfactorily, a fair proportion of nuts, to which practically no pericarp residue remains attached, will roll to the bottom of the slope, leaving much of the pericarp residue at the top held against the short length of board. Final hand-picking of the residue is, however, necessary.

The surface of the nuts was found to be still markedly oily. Quite an appreciable amount of oily cellular matter could be recovered by agitating the nuts on a wire screen. As the nuts rub against each other the oily residue falls away and passes between the meshes of the screen.

The nuts are removed for drying and cracking. These processes will not be referred to in the present paper.

The pericarp residue is set aside for second pressing.

Separation of the press residue is facilitated if the material before being treated as described can be warmed slightly. Heating can be carried out on iron sheets similar to those used in heating the pericarp residue for the second pressing as described in the next section.

5. *Second Pressing.*—Two sheets of corrugated iron are supported by means of bricks about 18 inches from the ground and a small fire lighted below the sheets. The pericarp residue is placed on the corrugated iron and moved continuously by means of a rake to warm the material and to drive off a large proportion of the moisture. Heating is continued until the material feels only slightly moist.

As soon as sufficient material is available to fill the cage, the second pressing is carried out. Experiments showed that three first pressings (450 lbs. of fruit) must be made before there was sufficient pericarp residue to fill the cage.

A similar procedure to that adopted for the first pressing is followed. As much pressure as the machine can exert is applied, appreciable pauses being made between each application to ensure an even distribution of pressure throughout the mass and consequently an even flow of oil.

The oil from the second pressing contains a much larger proportion of mucilaginous matter or sludge than that from the first pressing.

6. *Treatment of Crude Oil.*—The expressed oil, which contains both water and mucilaginous matter, is heated in a circular iron pan to evaporate the water and to coagulate the mucilage. Some of the mucilage floats to the surface and can be skimmed off by means of a ladle.

The period of heating is determined by the appearance of the oil, which gradually becomes clear as the water evaporates, and the remainder of the mucilaginous matter settles to the bottom of the pan as a sludge.

The contents of the pan are allowed to cool somewhat, skimmed again to remove the last traces of mucilage from the oil, which is filtered through fine cloth into a drum or tins.

The moisture content of the oil should not exceed 0.3 to 0.4 per cent., the dirt content 0.02 per cent. or less.

When ladling the oil care must be taken not to include any sludge, as its presence in the oil will result in a marked increase in acidity on storage.

To avoid loss of oil it is suggested that the top few inches of sludge, which contain the greater part of the oil entrained therein, should be set aside for mixing with the next batch of crude oil.

Results of Tests.

The results of efficiency tests show that with double pressing between 70 and 75 per cent. of the oil present in the fruit can be recovered.

The details of one test were as follows:—

	lbs.
Weight of fruit	450
	per cent.
Oil recovered	72.0
Losses of Oil:	
Pericarp residue	11.5
Surface of nuts	6.0
Sludge in oil recovery	10.5
	100.0
Calculated oil content of fruit	30.8
Acidity of oil (calculated as palmitic acid)	2.7

As far as could be judged the proportions of oil recovered in the first and second pressings were about 67 and 5 per cent. respectively.

Discussion.

The results show that using only improvised plant, apart from the press, the small-holder can attain with double pressing as described an efficiency of about 72

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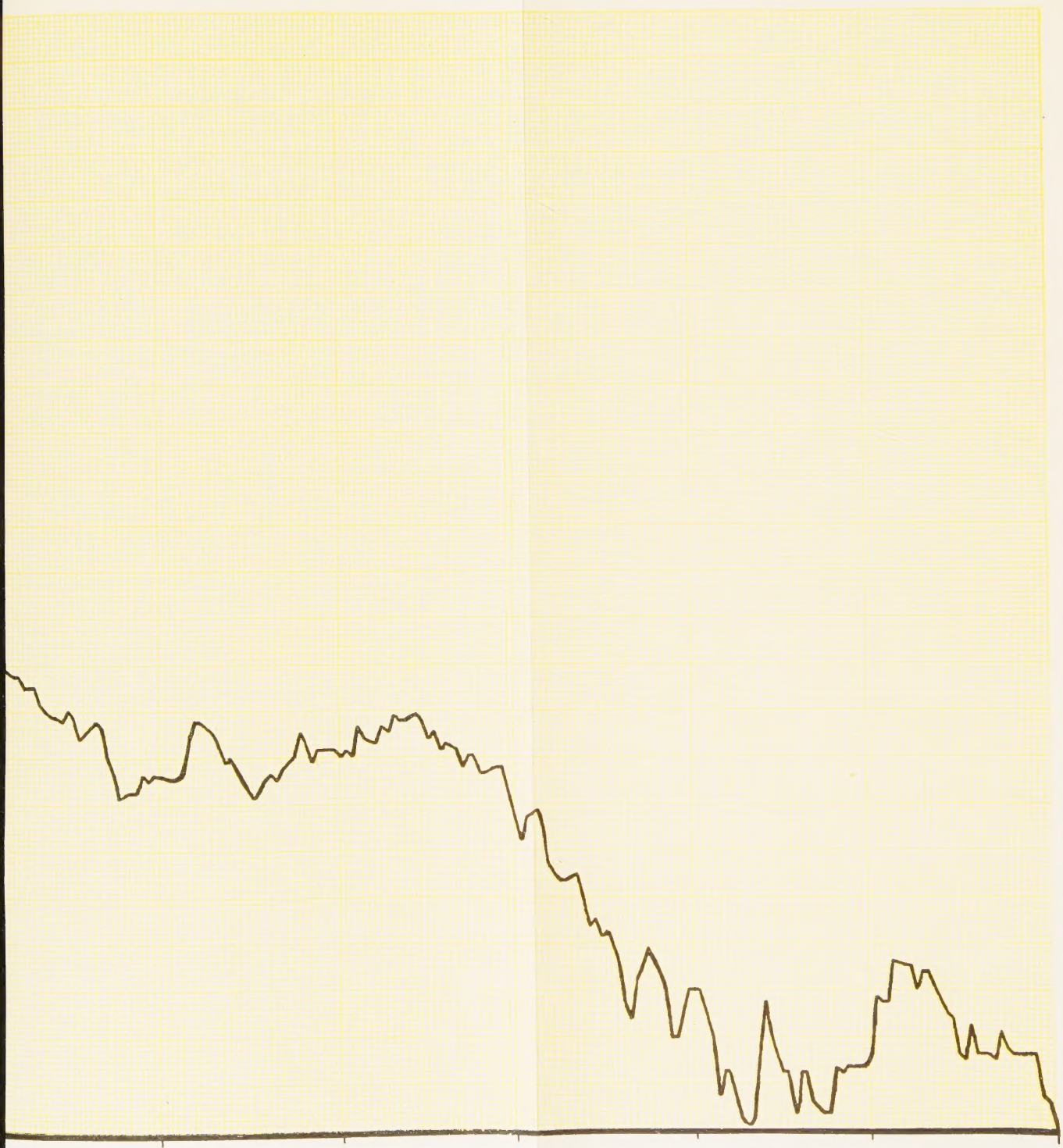

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per cent. This figure corresponds to a recovery of about 23 per cent. on the weight of ripe fruit treated, compared with a total oil content of about 31 per cent.

The wire-cage, complete with block and tackle, was used only for the purpose of convenience. These could be dispensed with without any appreciable reduction in speed of working, the loose fruit being tipped into the hot water and the sterilized fruit baled out with perforated dippers to which long wooden handles are attached.

The cost of the press landed in this country is about $170 (Straits currency). As far as the small-holder is concerned two questions arise: (*a*) the maximum acreage which a press of this type will serve, and (*b*) the minimum acreage on which a small-holder would feel inclined to spend the above sum for a press.

With regard to the maximum acreage the figure would appear to be about 40 acres, the details of the calculation being shown below.

It should be explained that in framing this calculation the following data have been assumed: (*a*) the oil palms are mature and the yield of oil using factory methods amounts to 15 cwts. of palm oil per acre per annum, (*b*) the small-holder with an assistant supervises the factory process, and (*c*) additional labour is available in the field to cut the bunches and deliver the clean fruit to the factory.

Taking conventional figures of 90 per cent. oil recovery on weight of fruit treated and 30 per cent. by weight of oil in the fruit, an output of 15 cwts. of palm oil per acre per annum is equivalent to approximately 6,200 lbs. of fruit per acre per annum.

Records collected from estates in Malaya show that during the peak month as much as 13 per cent. of the annual output of oil may be produced.[1] This is equivalent to about 800 lbs. of fruit per acre.

Working ten hours per day in the factory the two men should be able, with the incidental work involved in the refining of the crude oil, to treat by single pressing say seven charges per day, that is 1,050 lbs. of fruit.

If they are willing to work 30 days per month, during the peak month 30 x 1,050 lbs. of fruit can be treated.

Assuming that the yield of fruit in the peak month is 800 lbs. per acre, the maximum acreage which the press can serve is $\frac{30 \times 1050}{800} = 39.5$ acres.

It is realized that this estimate is conservative; it is based on the maximum output of fruit which two men can treat in an average working day, but the figure does not represent the capacity of the press.

Pressing is not the limiting factor; boiling of the fruit, pounding and separation of pericarp residue and nuts are far more important in that connexion. If more labour were available in the factory it is considered that one press of this type might serve double the area, say 70 to 80 acres.

The minimum acreage on which a small-holder would be willing to instal a press of this type is difficult to foretell. An acreage of 10 acres is suggested, but in any case the figure can only be a guess.

The estimated annual yield of oil from 40 acres, based on the above data and the results of the efficiency tests carried out, would amount to about 23 tons. This amount of oil is equivalent to about 11.5 cwts. per acre per annum, compared with the 15 cwts. per acre per annum that would be obtained if the fruit were treated in an estate factory.

Acknowledgment.

The authors wish to acknowledge the assistance received in the preparation of this paper from Mr. O. T. Faulkner, C.M.G., Adviser on Agriculture, Malay States, and officers of the Department of Agriculture, Nigeria, in supplying details of the press-process used in that country.

Reference.

(1) Bunting B., Georgi C. D. V., and Milsum J. N. The Oil Palm in Malaya. Malayan Planting Manual No. 1, 1935, p. 93.

Received for publication 25th January, 1938.

LOCAL ARECANUTS

BY

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Introductory.

The arecanut palm (*Areca catechu*, L.) is commonly found growing in Malay holdings throughout the country. It is not indigenous to Malaya and there is no exact knowledge where its original home was. There is evidence, however, that it has been cultivated in Malaya for many centuries, and in parts of Johore it is grown as a plantation crop. There are many races of the palm, but owing to cross-pollination and the difficulty experienced by the Asiatic cultivator in perpetuating desirable forms, these races are ill-defined.

During 1926 a collection of local arecanut varieties was made by the Botanical Division of the Department of Agriculture. The majority of the fruits were obtained from plantations at Batu Pahat, Johore, and the remainder from Selangor. Two varieties were selected from a mixed population of palms growing at the Central Experiment Station, Serdang.

The fruits were germinated at the Coconut Experiment Station, Port Swettenham, and planted out in 1927 and early 1928. The young palms were planted in line surrounding a rectangular block of coconuts, being spaced 10 feet apart in single rows. This planting arrangement does not allow of satisfactory comparison of crop production between varieties being made, since there is a complete lack of randomization. Further, since the palms are planted in line, yields are not comparable with palms established in a block of land. However, the spacing for all varieties and their treatment is the same, and soil conditions are fairly uniform, and in so far as methods of statistical analysis can be applied to the data under these conditions, the figures indicate that real varietal differences in yield exist.

Six years from planting, the palms produced a fair amount of fruit, and crop records from individual palms were taken in May, 1934, and have been recorded monthly since that date. Weights of fresh fruit from the thirteen varieties totalling 440 palms, are available for a period of three years, *i.e.* from May 1934 until April 1937, and these are summarized in this paper. In addition, analyses of fruit and nuts of average samples of all varieties have been undertaken by the Chemical Division and the writer is indebted to the Senior Chemist, S.S. and F.M.S. for this data.

Varieties Established.

It should be noted that the Malay nomenclature of arecanut varieties in unreliable. They are mostly named according to the size and shape of their fruits and kernels, the amount of endosperm and their taste. A more detailed study

of the subject is necessary before it is possible to state whether the names now employed are in general use or merely used in the district where the fruit was collected. Further, since the arecanut palm is normally cross-pollinated, owing to the sequence of male and female phases on the spadix, there is uncertainty as to what extent they may breed true to type.

Many of the palms growing at Port Swettenham have retained the distinguishing varietal characters of fruit and nut of the mother palms. Examination of fruits from all palms is necessary to obtain more exact information on this point.

The following list shows the varieties established, together with their origin and date of planting:—

Variety.	Origin.	Date planted.
Kuning	Batu Pahat, Johore.	September 1927
Jambu	- do -	- do -
Malan	- do -	- do -
Buntut Tabuan	- do -	- do -
Betul	- do -	- do -
Rambai	- do -	- do -
Telor	Kuala Lumpur and Kampong Kuantan, Selangor.	- do -
Kechil	Kuala Lumpur, Selangor.	- do -
Wangi	Asam Jawa, Selangor.	- do -
Kerdu	Kampong Asahan, Selangor.	- do -
Ranggong	Jeram, Selangor.	- do -
Seluang	Central Experiment Station, Serdang, (Block 8, row 61, palm 12).	April, 1928.
Gasing	Central Experiment Station, Serdang, (Block 8, row 62, palm 14).	- do -

Brief descriptions of the above varieties, together with illustrations of the fruits and nut, have already been published in this journal (1). In the article under reference, the races were classified according to the shape of the nuts, *i.e.* whether round or elongated.

In the following table, the actual yields of fresh fruit harvested from all varieties over the three year period are shown, together with the calculated amount of air-dry nut (10 per cent. moisture) per palm per annum.

Table I.

Total Yields of Fruit and Nut Per Palm.

Variety.	No. of Palms.	Weight of Fresh Fruit in lbs.				Air-dry Nut to Fresh Fruit.	Calculated Air-dry Nut per Palm per annum.
		May 1934 -Apr.1935	May 1935 -Apr. 1936	May 1936 -Apr. 1937	Mean per Palm per annum		
						per cent.	lbs.
Betul ...	21	757	806	702	36	24.1	8.7
Wangi ...	51	2,188	2,964	2,307	49	17.6	8.6
Ranggong ...	43	1,438	1,839	1,767	40	18.0	7.2
Seluang ...	41	1,652	1,459	1,632	38	18.7	7.1
Jambu ...	29	860	654	928	28	21.2	5.9
Telor ...	30	664	869	1,186	30	18.3	5.5
Buntut Tabuan ...	33	1,236	1,118	852	32	16.7	5.3
Kechil ...	20	375	314	841	25	19.2	4.8
Rambai ...	26	730	983	728	31	13.5	4.2
Kerdu ...	60	1,358	1,440	1,853	36	13.7	3.6
Kuning ...	35	853	879	1,111	27	12.7	3.4
Malan ...	18	332	494	419	23	14.5	3.3
Gasing ...	33	802	622	509	19	13.0	2.5
Totals ...	440	13,245	14,441	14,835			
Averages ...					32	17.0	5.4

The varieties are arranged in order of their ultimate yield of calculated air-dry nut per palm per annum. All are suitable for the local market. The commonest and most popular varieties are *Pinang betul, jambu, kuning, telor, ranggong, seluang,* and *kerdu.*

The mean yield of air-dry nut is 5.4 lbs. per palm for all varieties, over a period when the palms were seven to ten years old. It is unusual to meet with palms as a pure stand and, therefore, difficulty has been experienced in obtaining actual yields per acre from this crop. It is estimated, however, that on alluvial soil with close planting, *i.e.* 400 to 430 per acre, young palms yield between 10 and 15 piculs (1 picul = 133 lbs.) dry nut per annum per acre.

Soil Conditions.

The arecanut palm is considered to require a rich alluvial soil with plenty of moisture. A comparison between yields at the Coconut Experiment Station, Port Swettenham, situated on a heavy alluvial clay, and the Central Experiment Station, Serdang, where the arecanuts are growing on hill quartzite soil, shows considerably higher yields at the former Station, where the yield of air-dry nut per palm is 5.4 lbs., while on hill quartzite soil at Serdang, a yield of 1.5 lb. is the maximum so far obtained. These yields are not strictly comparable since the palms at Port Swettenham are planted in line, while those at Serdang are in a compact block, spaced 8 feet apart.

Growth of Palms.

The height of palms of all varieties was measured in August, 1937, *i.e.* ten years from planting, and little or no appreciable difference was found between varieties. Average height of palms is 30 feet from ground level to base of the petioles and a further 10 feet to the apex of young leaves. Thus the average growth increase of these palms has been so far 4 feet per annum.

Table II.

Analyses of Fruit and Nut.

Variety.	Palm No.	Average Weight of Fruit.	Proportion of Pericarp.	Proportion of Nut.	Average Weight of Air dry Nut.
		gms.	per cent.	per cent.	gms.
Betul* ...	20	60.4	65.5	34.5	14.6
Wangi* ...	5	67.5	70.0	30.0	11.9
Ranggong ...	7	57.4	67.0	33.0	10.6
Seluang ...	16	45.4	70.1	29.9	8.5
Jambu ...	5	58.2	62.8	37.2	12.4
Telor* ...	7	46.8	67.6	32.4	6.8
Buntut Tabuan ...	2	43.0	72.1	27.9	7.2
Kechil* ...	9	44.8	68.0	32.0	8.6
Rambai* ...	9	30.0	77.1	22.9	4.0
Kerdu* ...	5	51.0	76.0	24.0	7.0
Kuning* ...	20	63.8	79.5	20.5	8.1
Malan* ...	12	78.5	74.8	25.2	11.6
Gasing ...	14	39.2	77.6	22.4	5.1
AVERAGES ...		52.7	71.4	28.6	8.9

Analyses of Fruit and Nut.

In Table II the results of analysis of fruit and nut are shown together with the palm number from which the sample of fruit was obtained.

The moisture content of pericarp and nut was determined for the eight varieties marked with an asterisk and averaged 80.6 and 43.2 per cent. respectively.

Reference.

(1) Sands, W. N. Observations on the Betel-Nut Palm and Betel-Nuts. *Malayan Agricultural Journal*, Vol. XIV, No. 7, July 1926, p. 202.

Received for publication 28th December, 1937.

RICE IN MALAYA IN 1937

BY
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The average wholesale price of rice in 1937 was $4.02 per picul, as compared with $3.63 per picul in 1936. While Rangoon and Saigon rice prices advanced by averages of 31 and 33 cents per picul only, Siam rice (No. 2) rose by an average of 53 cents per picul. Considering that 50.5 per cent. of net imports were from Siam, (as compared with 63.2 per cent. in 1936) it follows that the Malayan consumer paid a good deal more for his rice in 1937 than he did in 1936. Burma rice comprised 43.8 per cent. of net imports (32 per cent. in 1936) and French Indo-China 4.1 per cent. (4 per cent. in 1936).

The retail price of rice advanced to a greater extent than the wholesale price; this remark applies in particular to Penang and Malacca, where the average price per gantang rose by 7 and 6 cents respectively — an increase of about 24 per cent.

No widespread abnormal conditions were reported from the chief rice-producing countries of the world, and there is no reason to suppose therefore that any drastic price movements are likely to be caused by shortage of supplies in 1938.

There was no change in the freight charges to Malaya and no major changes in local railway rates for transport of rice.

The details of wholesale and retail prices are given in Table I.

Table I.

Average Prices of Rice and Padi in Malaya in 1937.

Month	Wholesale Prices of Rice Dollars per Picul (133 lbs.)			Retail Prices of Rice Cents per Gantang (Gallon)			Price of Padi per Picul at Government Rice Mills Perak
	Siam No. 2 (ordinary)	Rangoon No. 1	Saigon No. 1 (Long Grain)	Singapore	Penang	Malacca	
January ...	4.95	3.67	4.50	32	37	35	1.90
February ...	4.66	3.67	4.02	32	36	33	2.00
March ...	4.44	3.60	3.82	29	36	30	2.00
April ...	4.40	3.57	3.70	29	37	33	2.00
May ...	4.21	3.62	3.60	28	36	32	2.00
June ...	3.91	3.57	3.65	28	35	30	2.00
July ...	4.08	3.55	3.72	28	36	32	2.00
August ...	4.79	3.92	4.12	29	40	34	2.00
September ...	4.57	3.92	4.12	34	37	34	2.00
October ...	4.39	4.00	3.97	31	35	34	2.00
November ...	4.12	3.92	3.82	29	36	32	2.00
December ...	4.14	3.95	3.97	28	36	29	2.00
Average for 1937 ...	4.39	3.75	3.92	30	36	32	1.99
Average for 1936 ...	3.86	3.44	3.59	28	29	26	1.91

Imports and Exports.

A statement of the annual imports and exports of rice with values for the past nine years, is given in Table II, from which it will be seen that consumption of imported rice in 1937 increased by 7.3 per cent. to the highest total reached since 1930. The gross imports declined slightly, while exports decreased by 24 per cent. This decrease in entrepot trade is mainly accounted for by the Netherlands Indies, shipments to which were 91,997 tons in 1937 as compared with 130,503 tons in 1936.

Table II.

Rice: Malayan Imports and Exports.

Year	Imports		Exports		Net Imports	
	Tons	Value $	Tons	Value $	Tons	Value $
1929 ...	785,558	95,461,036	233,897	28,031,407	551,661	67,429,629
1930 ...	800,443	87,666,723	208,688	23,361,561	591,755	64,305,162
1931 ...	691,112	48,458,102	175,385	13,453,189	515,727	35,004,913
1932 ...	592,209	39,632,925	183,209	12,660,493	409,000	26,972,432
1933 ...	592,912	33,846,158	159,746	9,493,291	433,166	24,352,867
1934 ...	619,199	32,813,558	165,968	8,609,566	453,231	24,203,992
1935 ...	655,845	40,114,794	184,463	11,060,993	471,382	29,053,801
1936 ...	715,632	43,053,805	181,837	10,846,378	533,795	32,207,427
1937 ...	711,581	47,800,364	138,518	9,589,376	573,063	38,210,988

The net imports of rice in 1937 were 573,063 tons as compared with 533,795 tons in 1936. Of 1937 net imports, 289,283 tons were from Siam, 250,792 tons from Burma, 23,623 tons were from French Indo-China and 9,365 tons from other countries.

The different grades of rice products imported during 1936 were as follows (net imports only are given):—cargo rice 26,328 tons, parboiled 62,738 tons, white rice 424,870 tons, broken rice 59,127 tons as compared with 23,526, 50,267, 374,890

and 85,112 tons respectively in 1936. Thus, while broken rice consumption declined in the year under review, the consumption of other classes of rice shewed a marked increase.

The total quantity of rice products imported for local consumption in 1937, including bran, rice flour and rice meal of which 179,183 tons, valued at $5,099,816 were imported, amounted to 752,246 tons valued at $43,310,804 as compared with 670,731 tons, valued at $35,955,855 in 1936. The net imports of padi, which amounted to 5,237 tons, valued $219,447, are not included in these figures.

Area and Yields.*

The area planted with "wet" padi in the season 1936-37 was 693,550 acres, constituting a record. Of this increase over the previous year of over 18,600 acres, the Federated Malay States were responsible for over 8,000 acres, Kedah 2,000 acres, Kelantan 7,000 acres. In other parts of the country the area planted was about the same as in the previous season.

All States in the Federation contributed an increased acreage, the increase being most pronounced in Pahang. While the Kelantan figures of area are considerably greater than those of 1936, it is admitted that it is extremely difficult to estimate areas in this State and the figures are, therefore, of doubtful value.

The production of padi from the Federated Malay States was about 2,000,000 gantangs greater in the season under review than in the previous season, but in view of the increased acreage in 1937, the yield per acre was less favourable. The position in the Straits Settlements calls for no comment, acreage and production in 1937 being about the same as in the previous year.

The most marked decline is shewn by the Unfederated Malay States, where in 1937, despite an increased acreage of 9,000 acres, the total crop of "wet" padi harvested was 15,500,000 gantangs (equal to 23,000 tons of rice) less than in 1936. The main centres of this decrease were Kedah and the neighbouring small State of Perlis, the former State obtaining 14,000,000 gantangs less and the latter State 1,600,000 gantangs less than in 1936.

The decline in yields is ascribed mainly to seasonal variation, the season being less favourable for the crop. In addition, Kedah reports state that over 9,000 acres were affected by pests, disease and inundation by sea water, and over 600 acres by drought which resulted in a total loss of crop on 400 acres.

A summary of the areas and production of padi for the past eight seasons is given in Table III.

* Estimating the area and yields of padi presents great difficulty, and the following figures are therefore given with due reservations.

Table III.

Areas and Yields of Padi.

Year	"Wet" Padi			"Dry" Padi			Total	
	Area Acres	Yield Gantangs	Gantangs Per Acre	Area Acres	Yield Gantangs	Gantangs Per Acre	Area Acres	Yield Gantangs
1929 - 30	629,650	103,624,000	164	27,550	3,160,000	114	657,200	106,784,000
1930 - 31	603,070	166,845,000	277	104,670	9,122,000	87	707,740	175,967,000
1931 - 32	635,130	184,631,000	291	89,850	12,472,000	139	724,980	197,103,000
1932 - 33	674,920	186,345,000	276	91,990	13,416,000	146	766,910	199,761,000
1933 - 34	691,110	215,098,000	311	74,140	9,389,000	127	765,250	224,487,000
1934 - 35	669,290	213,835,000	319	65,440	6,720,000	106	734,730	220,555,000
1935 - 36	674,900	219,786,000	325	50,150	8,087,000	161	725,050	227,873,000
1936 - 37	693,550	206,256,000	297	46,490	6,354,000	137	740,040	212,610,000

(Acreage to nearest 10 acres: yields to nearest 1,000 gantangs)

Table IV.

Area of Land Planted in Malaya and Yield of Rice.

Season	F.M.S.		S. S.		U.M.S.		Total	
	Area Acres	Production Rice Tons	Area Acres	Production Rice Tons	Area Acres	Production Rice Tons	Area Acres	Production Rice Tons
1929 - 30	174,466	55,577	67,005	25,944	415,727	78,815	657,198	160,335
1930 - 31	178,930	57,027	67,350	39,503	461,460	167,672	707,740	264,202
1931 - 32	194,580	67,658	67,980	39,626	462,420	188,664	724,980	295,948
1932 - 33	214,160	76,331	70,530	36,051	482,220	187,539	766,910	299,921
1933 - 34	195,690	78,835	70,550	44,180	499,010	214,053	765,250	337,068
1934 - 35	176,750	79,559	68,500	43,988	489,480	207,617	734,730	331,164
1935 - 36	178,020	78,011	67,750	37,818	479,280	226,321	725,050	342,150
1936 - 37	185,730	80,872	69,090	37,622	485,220	200,740	740,040	319,234

(Yield estimated on a basis of 666 gantangs of padi = 1 ton of rice)

Table V.

Area of Land Planted in Malaya and Yields of Padi.

Season 1936-1937.

State or Territory	Wet		Dry		Total	
	Acres	Gantangs	Acres	Gantangs	Acres	Gantangs
F.M.S.—						
Perak ...	93,110	30,169,000	1,980	283,000	95,090	30,452,000
Selangor ...	19,980	5,224,000	410	83,000	20,390	5,307,000
N. Sembilan ...	34,370	10,779,000	20	4,000	34,390	10,783,000
Pahang ...	35,210	7,195,000	650	124,000	35,860	7,319,000
Total ...	182,670	53,367,000	3,060	494,000	185,730	53,861,000
S.S.—						
P. Wellesley ...	32,500	11,202,000	300	60,000	32,800	11,262,000
Malacca ...	32,310	12,275,000	—	—	32,310	12,275,000
Penang ...	3,980	1,519,000	—	—	3,980	1,519,000
Total ...	68,790	24,996,000	300	60,000	69,090	25,056,000
U.M.S.—						
Johore ...	8,030	1,468,000	880	88,000	8,910	1,556,000
Kedah ...	246,310	81,854,000	1,710	364,000	248,020	82,218,000
Perlis ...	41,870	10,519,000	—	—	41,870	10,519,000
Kelantan ...	113,110	26,811,000	29,800	4,301,000	142,910	31,112,000
Trengganu ...	32,770	7,241,000	10,740	1,047,000	43,510	8,288,000
Total ...	442,090	127,893,000	43,130	5,800,000	485,220	133,693,000
Total Malaya ...	693,550	206,256,000	46,490	6,354,000	740,040	212,610,000

Note:— Acreage to the nearest 10 acres. Yield to the nearest 1000 gantangs.

Consumption Compared with Production.

The greater prosperity of the country in 1937 as compared with the previous year has been responsible for an influx of Indian and Chinese labour into Malaya and therefore an increased consumption of rice, which has to be met by increased imports of this food. Thus, with local harvests at normal, the percentage of production to net imports declines to 56 as compared with 64 in 1936, while the percentage of production to consumption declines to 36 from 39 in 1936.

In view of the present position of Malaya's two great industries which leads one to anticipate that there will be no considerable immigation in 1938, and on present crop prospects in this country, it is probable that the percentage of production to consumption in 1938 should be slightly more favourable than it has been for the past two years.

Table VI.

Malayan Production of Rice in Relation to Net Imports and Consumption 1930-1937.

	1930	1931	1932	1933	1934	1935	1936	1937
Net imports (tons) ...	591,755	515,727	409,000	433,166	453,229	474,955	533,795	573,063
Production (tons) ...	160,335	264,202	295,948	299,921	337,068	331,164	342,150	319,234
Consumption (tons) ...	752,090	779,929	704,948	733,087	790,297	806,119	875,945	892,297
Percentage of production to net imports ...	27	51	72	69	74	69	64	56
Percentage of production to consumption ...	21	34	42	41	43	41	39	36

Acknowledgments.

The Field Branch of the Department of Agriculture, in collaboration with the Land Officers, were responsible for the estimates of areas and yields as summarized in Table V. The figures for imports and exports, and values thereof, are obtained from the Monthly Summaries of Imports and Exports, published by the Statistics Department, Straits Settlements and Federated Malay States, and are subject to minor adjustments at a later date.

CONDITIONS ON RUBBER SMALL HOLDINGS IN MALAYA

4th Quarter, 1937.

Prepared by the Economics Branch of the Department of Agriculture, S.S. and F.M.S. in collaboration with the Field Branch of the Department.

Rainfall.

As usual in the last quarter of the year, rainfall was heavy, but reports indicate that it was extremely irregular. In nearly all parts of the Peninsula October was a very wet month with rainfall above average, though parts of Negri Sembilan and the north districts of Kedah experienced dry conditions. December was abnormally dry in several States, notable exceptions being Johore, Malacca and Kedah.

Prices and Production.

Tables I and II summarize prices paid for small-holders' rubber during the quarter, and Table III shews production during the year in comparison with 1936. The prices are tabulated from records collected at a number of centres in each State. The table of production is compiled from the monthly reports of production, stocks, imports and exports of rubber, published by the Registrar-General of Statistics, S.S. and F.M.S.

Prices of coupons were low in the first two months of the quarter but rose considerably in December when presumably dealers had to cover heavy purchases of uncouponed rubber. In Perak North coupons rose by $3 to $15.80 per picul equivalent. In Perak South the increase was much more marked, from $10 to $15—$18 in December. Province Wellesley reported $13 in December as compared with $7 at the end of November, and Malacca $17 to $18 at the close of the quarter whereas coupons were practically unsaleable in October and November.

Tapping and Condition of Holdings.

The results of the quarterly survey of small holdings out of tapping are tabulated in Table IV, and a summary and comparison with previous quarters appear in Table V. The area of small holdings out of tapping is estimated by counting the number of holdings not tapping in a certain area and applying the percentage to the total area of small holdings in the relative District.

It will be seen that the area out of tapping increased in certain districts during the quarter under review, and this increase was due principally to the wet weather which rendered tapping impossible, and also to the Hari Raya festivities.

The weather was also responsible for the cessation of clearing of undergrowth and lalang.

Reports indicate that the generally improved conditions of small holdings are being maintained, particularly with regard to disease control and care of utensils. Small-holders, both Malay and Chinese, respond well to the advice of the Asiatic Rubber Instructors.

Table I.

Lowest and Highest Rubber Prices Paid by Local Rubber Dealers.

(In Straits dollars per picul (133 1/3 lbs.))

4th Quarter 1937.

	Penang	Perak	Selangor	Negri Sembilan	Pahang	Malacca	Kedah	Johore
			OCTOBER					
Smoked sheet	33.00-35.00	27.00-36.00	30.00-36.00	28.00-37.00	27.00-36.50	29.50-32.00	29.50-40.00	29.00-36.60
Unsmoked sheet	28.00-33.00	24.00-34.00	20.00-32.00	25.00-36.00	24.00-35.50	28.00-30.00	26.00-35.50	24.00-35.60
Scrap	12.00-25.00	17.00-22.00	18.00-23.00	—	18.00-21.00	19.50-23.00	16.00-24.50	14.00-23.00
			NOVEMBER					
Smoked sheet	27.50-32.00	25.00-32.30	26.00-31.00	25.00-32.70	24.00-30.20	28.00-33.00	26.50-31.00	23.00-31.00
Unsmoked sheet	25.00-31.00	21.00-32.50	19.00-28.40	22.00-28.00	22.00-29.00	27.00-31.50	24.00-30.00	22.00-29.50
Scrap	14.00-20.00	14.00-22.00	14.00-18.00	—	16.00-17.70	17.50-21.00	16.00-23.00	13.50-19.00
			DECEMBER					
Smoked sheet	28.00-33.00	26.00-31.25	26.50-32.25	26.00-31.50	24.00-35.10	28.50-32.00	28.00-32.50	24.00-31.20
Unsmoked sheet	27.00-30.00	23.00-29.25	22.00-29.25	20.00-30.00	22.00-29.50	26.00-29.50	23.00-30.00	22.00-30.45
Scrap	16.00-21.00	15.00-22.00	15.00-20.00	—	16.00-18.00	15.50-23.00	16.00-23.50	16.00-22.70

Table II.

Mean of Lowest and Highest Rubber Prices Paid by Local Dealers at a number of Centres in each State.

(In Straits dollars per picul (133 1/3 lbs.))

4th Quarter 1937.

	Penang	Perak	Selangor	Negri Sembilan	Pahang	Malacca	Kedah	Johore
				OCTOBER				
Smoked sheet	33.00-34.60	29.57-33.65	31.25-33.58	30.20-36.16	28.30-34.10	30.17-31.50	29.70-34.10	30.06-33.79
Unsmoked sheet	29.38-33.00	26.09-29.91	25.50-29.00	26.90-33.60	25.75-30.81	28.50-29.50	26.50-31.50	29.70-31.66
Scrap	18.25-21.12	17.67-20.00	18.67-21.00	—	18.00-21.00	20.66-21.50	18.12-23.12	17.41-20.00
				NOVEMBER				
Smoked sheet	28.83-30.50	26.48-28.70	27.13-30.18	26.20-30.82	26.58-29.05	29.17-30.66	27.00-29.90	26.59-28.93
Unsmoked sheet	25.75-29.25	23.15-26.10	23.50-26.10	23.40-27.10	23.63-26.88	27.50-29.17	24.88-27.62	24.40-27.05
Scrap	15.50-18.25	16.00-20.00	15.33-18.00	—	16.00-17.70	18.83-19.83	17.75-21.25	15.28-17.08
				DECEMBER				
Smoked sheet	29.00-31.33	27.53-29.58	27.92-30.24	27.42-31.10	27.42-30.30	29.50-30.66	28.80-31.30	26.66-29.64
Unsmoked sheet	27.75-29.75	24.47-26.71	24.75-27.44	23.70-28.76	25.18-27.25	27.17-28.33	25.75-29.00	24.84-28.25
Scrap	17.25-19.25	17.33-20.33	16.67-19.67	—	16.00-18.00	18.83-20.17	19.25-22.62	17.53-20.74

Table III.

Production of Rubber on Small Holdings

(in tons)

	Total Year 1936	1st Quarter 1937	2nd Quarter 1937	3rd Quarter 1937	4th Quarter 1937	Total Year 1937
Federated Malay States	62,596	19,764	19,975	26,253	25,142	91,134
Unfederated Malay States	56,759	19,310	18,568	21,446	21,281	80,605
Straits Settlements	12,532	3,769	4,198	4,727	4,036	16,730
Total ...	131,887	42,843	42,741	52,426	50,459	188,469

Owner tappers are taking advice on better systems of tapping, but difficulties are encountered when owners will not adequately supervise paid labour, particularly where work is given to poorer relations.

It has been evident for some time that considerably more attention is now being paid to tapping methods and quality of tapping on small holdings, and this improvement is particularly noticeable on the medium-sized holdings of Chinese ownership. The tapping on such holdings is often equal to the standard of estate practice, and it is possible that in many cases the owners have gained their knowledge while employed on large estates, in addition to benefitting from the practical demonstrations of the Asiatic Rubber Instructors.

Diseases.

The wet weather was responsible for considerable outbreaks of Mouldy Rot, but these were successfully kept under control, and large quantities of approved disinfectants were distributed through the Department of Agriculture. In Perak North, lectures and demonstrations on the control of Mouldy Rot were given with satisfactory attendances and results. The Perak South report points out that the Hari Raya festivities were responsible for the more than usual seasonal increase in this disease, as many small-holders required ready cash and tapped their trees under unfavourable weather conditions.

Sporadic outbreaks of Pink Disease were reported in Pahang.

Root disease was reported from every district in the Johore North Circle and is mentioned in several other reports.

Table IV.

Estimated Acreage of Tappable Rubber which was out of Tapping on Holdings of less than 100 Acres, at the end of December, 1937.

PERAK				SELANGOR				NEGRI SEMBILAN				PAHANG			
District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage
Batang Padang	36,187	3,300	9	Klang†	16,143	2,000	16	Seremban	23,639	12,500	53	Raub	10,534	1,700	16
Kinta	38,874	2,300	6	Kuala Langat†	23,881	3,800	16	Tampin	21,896	13,800	63	Kuala Lipis	15,457	500	3
Kuala Kangsar	92,166	11,100	12	Ulu Langat	45,012	6,300	14	Kuala Pilah	31,832	12,100	38	Bentong	12,224	1,700	14
Upper Perak	15,590	3,400	22	Ulu Selangor	31,463	4,700	15	Jelebu	9,097	1,000	11	Other Districts†	40,373	5,600	12
Larut & Selama	43,132	3,900	9	Kuala Lumpur	20,277	4,700	23	Port Dickson	11,133	5,600	50				
Krian	9,408	2,000	21	Kuala Selangor†	8,417	1,300	16								
Lower Perak*	26,735	3,500	13												
Dindings	9,873	7,000	71												
	271,965	36,500	13		145,193	23,400	16		97,597	45,000	46		84,588	9,500	11

MALACCA				PENANG & P. WELLESLEY				SINGAPORE			
District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage	District	Total Tappable area	Total area untapped	Percentage
Central	14,093	1,500	11	North	3,549	100	3	Singapore	20,115	2,000	10
Alor Gajah	30,838	1,200	4	Central	10,785	2,500	23				
Jasin	25,286	3,300	13	South	8,936	800	9				
				Penang	15,822	1,700	11				
	70,217	6,000	9		39,092	5,100	13		20,115	2,000	10

JOHORE	350,007	50,000	16
KEDAH	102,126	11,200	11
PERLIS	2,916		
KELANTAN & † TRENGGANU	49,133 / 29,836	13,100	16

The percentage of areas out of tapping in September, 1937, was as follows:—Perak 13, Selangor 14, Negri Sembilan 36, Pahang 9, Malacca 8, Penang and Province Wellesley 10, Singapore 3, Johore 8, Kedah 10.

* Estimated from percentage for Kuala Kangsar.

†Estimated from percentage for other Districts in the State.

‡Estimated from percentage for rest of Malaya.

Table V.

Comparison of Areas of Rubber Small Holdings Out of Tapping.

	December, 1936		September, 1937		December, 1937	
	Acres	Percentage	Acres	Percentage	Acres	Percentage
F.M.S.	202,600	37.5	96,100	16.0	114,400	19.1
S.S.	22,200	18.0	10,200	7.9	13,100	10.1
U.M.S	134,500	26.6	42,800	7.9	74,300	13.9
Malaya	359,300	30.8	149,100	11.7	201,800	16.0

In Johore North special demonstrations have been given by the Asiatic Rubber Instructor in the use of chemicals for the control of "white ants". Control measures were also introduced in Raub (Pahang).

General.

The Perak North report stated that there had been a good demand for scrap during the quarter.

In Perak South one smoking-cabinet was completed during the quarter, and three others commenced in October were unfinished.

Budded small holdings in Batang Padang (Perak South) have had earlier failures rebudded with satisfactory results in most cases.

In Negri Sembilan part of a 50 acre holding has been cut out for replanting.

Selling on co-operative lines in Temerloh District (Pahang) was continued with success during the quarter. Some grading was done by the Asiatic Rubber Instructor in Raub.

In Pahang, 43 new smoke cabinets were erected during the quarter, making a total of 166 in the State, of which practically all were in constant use. Consequent on increased quantities of smoked sheet being prepared, dealers in Raub dropped the premium for smoked sheet from $1—$3 to 50—80 cents in order to try to stop the loss of their smoking trade.

The Rubber Dealers' Scheme in Pahang is reported to continue to work satisfactorily, but constant supervision is necessary.

General economic conditions on small holdings were fair during the quarter. Despite declining prices small-holders were able to sell large quantities of uncouponed rubber at steady prices which helped to maintain a reasonable standard of living. The sale of uncouponed rubber often means extra labour for tapping, thus creating a market for casual labour.

Reviews.

A Review of the Literature on Stock-Scion Incompatibility in Fruit Trees, with particular reference to Pome and Stone Fruits.

By G. K. Argles, Technical Communication 9 of the Imperial Bureau of Fruit Production, East Malling, Kent, England, 1937, pp. 113, bibl. 194. Price five shillings.

The problem of incompatibility has loomed ever larger with the increasing realization of the advantages to be gained by the use of tested clonal rootstocks for the production of uniformly excellent fruit.

The literature on the subject is considerable, but it is scattered over very many journals, bulletins and books, and is not always easy to follow. In it the term "incompatibility" is used extremely loosely and may mean much or little. The author here briefly summarizes the phenomena which occur as the result of slight or pronounced incompatibility in different stock-scion combinations.

The horticulturist is often faced with the problem of growing varieties of fruit in localities where there is no experience to guide him. If he knows that under certain conditions, which may in some respects resemble his own, certain rootstocks have given promising results with particular varieties, at least he has something on which to base his trials. He would be most unfortunate if, as regards the common deciduous tree fruits of commerce, he did not find some guidance in these pages.

The physiologist, moreover, has in this common feature of practical horticultural practice a unique investigational field at his disposal. The author gives him a firm basis on which to work.

First the manifestations or symptoms of incompatibility in fruit trees are considered and their possible causes discussed. Next the compatibility or incompatibility shewn by individual varieties of common deciduous fruit trees in respect of particular rootstocks is noted, considerable attention being paid to the practical field experience of research workers in different parts of the world with particular scions and rootstocks.

Certain general conclusions are drawn with regard to both the symptoms and the cause of inherent incompatibility, and tentative suggestions are made for drawing up a research programme to investigate the problem.

In an appendix covering 40 pages are tabulated the many and often contradictory records of compatibility and incompatibility between particular rootstocks and particular varieties. They should prove helpful not only to the physiological investigator but also to the practical horticulturist.

Manual of Rubber Planting (Malaya).

Compiled by A. T. Edgar, A.I.S.P. Published by the Incorporated Society of Planters, Kuala Lumpur, F.M.S., 1937, 411 pp. Illustrated. Price $8 (Straits Currency).

The literature on rubber planting is extensive and somewhat diffuse; the compilation of a connected account of present-day methods, therefore, must have been a task of some magnitude, and planters in Malaya should be grateful to the compiler, Mr. A. T. Edgar, and to the publishers, The Incorporated Society of Planters, for the addition to rubber-planting literature of this Manual of Rubber Planting.

Mr. Edgar is a practical rubber planter, a fact which is evident from his selection of material and the form of its presentation to the reader. He has drawn freely from the publications of the Rubber Research Institute of Malaya with the result that in Part I we are given an authoritative exposition supported by the compiler's personal experience.

In the compass of about 300 pages an account is given of the process of rubber planting, from selection of the land to preparation of the rubber in the factory. This constitutes Part I of this volume, divided into twelve convenient sections. The subjects treated are land tenure, choice of land and opening up; cover crops, planting, budgrafting, seed selection and breeding, maintenance of young clearings and of old rubber, tapping, pests and diseases, manuring old rubber, replanting, collection and preparation, and preservation of latex for export.

Senior planters are probably fully informed on the subjects dealt with in this book; nevertheless, both they and their juniors should find the book useful for reference purposes. Its use in this connexion, however, would have been enhanced by the inclusion of a bibliography of up-to-date literature on rubber planting. Provision has been made for the issue from time to time of supplements to the volume. Perhaps the compiler will use this means of adding a comprehensive bibliography.

The main purpose of the Manual is to serve as a text book under the Technical Education Scheme of the Incorporated Society of Planters, and for this purpose Part I should be admirably suited.

Part II is a collection of articles on a number of subjects connected with the duties of a planter, and therefore lacks the completeness of Part I. Each of the thirteen sections of Part II deals with a particular aspect of planting. Perhaps the most interesting are "Some Notes on Estate Sanitation for Planters," and "Timbers of Malaya;" but the other subjects, treating with housing, labour, co-operative societies, estate records, concrete, notes on buildings, surveying instruments and equipment, roadmaking and rainfall are most informative.

The compiler has approached his subject from many angles and the result is an informative volume of value to the reader for whom it was compiled.

D. H. G.

The M.A.H.A. Magazine.

Published quarterly by the Malayan Agri-Horticultural Association, Kuala Lumpur, F.M.S. Price $1.20 per annum, post free.

The first number of Vol. VIII of *The M.A.H.A. Magazine*—the official organ of the Malayan Agri-Horticultural Association—has recently appeared. The magazine makes a strong appeal to garden lovers, the present number containing six articles on horticulture. In view of the fact that this publication is the official organ of both the Selangor and Singapore Gardening Societies, it cannot be held that 25 pages devoted to horticulture of a total of 46 pages is giving too much attention to gardening. While there are several Malayan periodicals concerned with agriculture in its various aspects, *The M.A.H.A. Magazine* is the only local publication in which a section is devoted to horticulture.

Although horticulture figures so prominently, the pages of *The M.A.H.A. Magazine* are open to many other subjects of interest, and in looking through the past year's issues, interesting articles are found on such widely different subjects as poultry, arts and crafts, painting, nutrition, cookery, and insects. The Association gives good value for the very modest subscription and the magazine is deserving of a large circulation.

D. H. G.

FERTILIZER PRICES, JANUARY, 1938.

The following are the prices at the end of January, 1938, of some of the more important fertilizers. All quotations are *ex* Port Swettenham, F.M.S., or Singapore.

Product.	Analysis				Price per ton $
	Nitrogen (N)	Phosphoric Acid (P_2O_5)		Potash (K_2O)	
		Soluble	Insoluble		
Sulphate of Ammonia ...	20	—	—	—	72.75
Calcium Cyanamide ...	20.6	—	—	—	80.00
Muriate of Potash ...	—	—	—	50	112.00
Sulphate of Potash ...	—	—	—	48	112.00
Superphosphate (concentrated) ...	—	39 - 40	—	—	105.00
Superphosphate ...	—	16 - 18	—	—	60.00
Basic Slag ...	—	16	—	—	50.00
Rock Phosphate (Christmas Island) ...	—	11*	38‡	—	33.50
Rock Phosphate (very finely ground Gafsa) ...	—	11*	26 - 28‡	—	40.00
Lime ...	—	—	—	—	20.00

* Citric soluble. ‡ Total.

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports of Agricultural Officers.

January, 1938.

The Weather.

The first three weeks of January were an exceptionally dry period throughout the Peninsula. The rainfall was considerably below the average for the month at all stations except Singapore, where precipitation was only slightly below normal, and a north-easterly breeze prevailed. There were occasional thunderstorms in many localities towards the end of the month with heavy rainfall of short duration.

Remarks on Crops.

Rubber.—The market opened after the New Year holidays at a slightly lower figure than the December quotations but remained fairly steady at from about $28 to $29 a picul for smoked sheet. In all parts except Johore Bahru the price of coupons appreciated further and the prices offered for uncouponed rubber declined. The quotations for coupons ranged between $14 and $20 per picul equivalent. At Johore Bahru, however, the quotations for coupons were slightly lower than for last month whilst quotations for uncouponed rubber ranged between $10 and $12 per picul as compared with $4 to $5 for December.

The erection of seven more smoke cabinets in Brunei has brought the total to 219.

The Licensing Board of Batang Padang, Perak, have required all dealers within the District to display price boards and samples of grades 1 to 5 of smoked sheet with effect from February 1st. An attempt is being made to obtain from the 59 dealers concerned a census of the amounts of the different grades of rubber dealt in during 1937, to serve as a standard for comparison with transactions during the current year.

Padi.—The general review given last month remains substantially correct. In the Selangor report mention is made of the improvement effected by irrigation in the Berangan area where the crop promises to be much better than last year and the area planted is 1,200 acres as compared with 330 acres last season.

Reports of empty and poorly-filled ears have been received from Kedah, North Province Wellesley, the Sega area of Raub District of Pahang, and the Rembau-Tampin Districts of Negri Sembilan. The causes of failure to "set" grain are obscure, but it is significant that the incidence of the trouble is specially noticeable in a season characterized by scarcity of rainfall during a portion of the growing period and an exceptionally dry period, in respect of both low rainfall and a comparatively drying wind, during flowering and the later stages of the plants' growth. Investigations at Linggi in Malacca, where empty ears have been a noticeable

phenomenon every season for many years, have revealed that thrips are present on the padi panicles, but further investigation will be necessary before it can be determined whether or not the thrips have any direct connexion with the empty ears. Observations would seem to indicate that the occurrence of empty ears is connected, in at least some instances, with some as yet undetermined unsuitability of either soil or water or both. On the other hand, a pot experiment in a greenhouse is on record which demonstrated that a dry atmosphere is detrimental to the fertilization of padi. These particulars are recorded as a guide to observers in areas where an unusual proportion of empty ears are produced.

Agricultural and Padi Stations.

There is little of special interest to record under this heading. At Cheras Agricultural Station half the cinnamon trees were coppiced some time ago and the bark subsequently prepared was marketed during the month. A Kuala Lumpur firm reported very favourably on the product and said it was superior to the imported product and that they would be prepared to take a fair quantity of the Malayan product if available. Harvesting was in progress at many Padi Stations.

CORRECTION.

From the Districts, January 1938, page 38, table of poultry weights. Batch 3 should read "total chickens, 36, average weight 1 lb. 5 ozs."

DEPARTMENTAL NOTES

Visit of Sir Frank A. Stockdale, K.C.M.G., C.B.E.

Sir Frank A. Stockdale, Agricultural Adviser to the Secretary of State for the Colonies, arrived in Penang on the 28th January 1938, on an official visit to Malaya of about one month.

Appointment.

Mr. P. V. Ormiston, B.A. (Cantab.) has been appointed to be an Agricultural Officer, Department of Agriculture, Straits Settlements and Federated Malay States, with effect from 3rd January 1938.

Leave.

Mr. C. H. Burgess, Agricultural Officer, has been granted 179 days leave from 4th January 1938 to 11th July 1938 inclusive.

Mr. J. W. Jolly, Agricultural Officer, has been granted 240 days leave from 15th January to 11th September 1938 inclusive.

Mr. Gunn Lay Teik, Assistant Analyst, returned from leave on 13th January 1938.

Mr. J. H. Dennett, Senior Chemist (Soils), returned from leave on 23rd January 1938.

Mr. A. Thompson, Plant Pathologist, returned from leave on 28th January, 1938.

Statistical.

MARKET PRICES.

January, 1938.

Major Crops.

Rubber.—The market remained at a low level throughout the month, and though prices improved slightly in the second half of the month, this tendency disappeared at the close when the market was again falling.

Spot loose in Singapore opened at $22\frac{3}{4}$ cents per lb., and after immediately falling to $21\frac{3}{4}$ cents improved to $24\frac{1}{8}$ cents on the 26th, weakening again to close at 23 cents.

The average price for the month of No. 1. X. Rubber Smoked Sheet was 23.08 cents per lb. as compared with 24.16 cents in December. The London average price was 7.07 pence per lb., and the New York price 14.54 cents gold, as compared with 7.27 pence and 14.97 cents gold in December.

Table I.

Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, January, 1938.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.				Batu Pahat, Johore.			
	6	13	20	27	5	12	19	26	5	12	19	26
Smoked sheet	27.25	28.00	28.00	28.50	26.00	28.00	27.00	28.50				
Unsmoked sheet	26.64	25.95	26.76	27.30	23.57				24.00	24 70	25.00	26.50
Scrap	18.00	19.00										

Transport by F.M.S.R. lorry service Kuala Pilah to Seremban 12 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.
Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.
Transport from Kuala Kangsar to Prai by railway $6.20 per ton.
Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).
At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.
At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

Palm Oil.—There was no change in the market for Malayan palm oil but kernels fell in the second half of the month. January prices are given in Table II.

Table II.

Prices of Palm Oil and Palm Kernels.

Date 1938.		Palm Oil in Bulk, c i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
		per ton	per ton
January	7	£ 17. 0. 0	£ 10. 10. 0
,,	14	17. 0. 0	10. 10. 0
,,	21	17. 0. 0	10. 7. 6
,,	28	17. 0. 0	10. 0. 0

Copra.—The copra market in Singapore fell very heavily during January, weakening to $4 per picul in the last week of the month. The sun-dried grade opened at $4.75 per picul, and after the 12th January fell steadily, reaching $4 on the 27th and 28th, and closing at $4.05.

The average price for the month for the sun-dried grade was $4.41 per picul and for the mixed grade $4.05, as compared with $4.81 and $4.54 respectively in December.

Copra cake remained unchanged at $1.80 per picul as compared with $2.15 in December.

Rice.—The average wholesale Singapore prices of rice per picul in December were as follows:—Siam No. 2 (ordinary) $4.14; Rangoon No. 1 $3.95; Saigon No. 1 $3.97; as compared with $4.12, $3.92 and $3.82 in November, and with $4.35, $3.47 and $3.92 in December 1936.

The average wholesale prices for the year were respectively $4.39, $3.75 and $3.92, as compared with $3.86, $3.44 and $3.59 for the year 1936.

The average retail prices in cents per gantang of No. 2 Siam rice in December were:—Singapore 28, Penang 36, Malacca 29, as compared with 29, 36 and 32 respectively in November. The average retail prices for the year were 30, 36 and 32 respectively.

The average declared trade value of imports during December was $3.98 per picul as compared with $4.09 in November and $4.09 in October. The average for the year was $4.00 as compared with $3.58 for the year 1936.

Padi.—The price of padi at the Government Rice Mills, Perak, continued at $2 per picul. Retail prices of padi ranged from 6 to 16 cents per gantang.

Pineapples.—Prices per case continued unchanged in Singapore, and were: G.A.Q.: Cubes $2.70, Sliced Flat $2.65, Sliced Tall $2.80; Golden Quality: $2.85, $2.80 and $2.95 respectively.

Prices of fresh fruit per 100 were as follows:—Selangor 40 to 52 cents; Singapore 70 cents to $1.10; Johore 1st quality 60 to 80 cents, 2nd quality 45 to 55 cents, 3rd quality 30 to 40 cents.

Beverages.

Tea.—Seven consignments of Malayan tea were sold on the London market during January. Three consignments were of upland tea and were sold at 1s. 2d. and 1s. 2¼d. per lb. The lowland tea was sold at prices ranging from 1s. 0½d. to 1s. 1¾d. per lb.

Average London prices per lb. during January for consignments of tea from other countries were as follows:—Ceylon 1s. 3.52d., Java 1s. 0.72d., Indian Northern 1s. 2.07d., Indian Southern 1s. 2.24d., Sumatra 11.54d.

The latest Colombo average prices available quoted from *The Weekly Tea Market Report,* 25th January 1938, of the Colombo Brokers' Association, are as follows, in rupee cents per lb.: High Grown Teas 83 cents, Medium Grown Teas 72 cents, Low Grown Teas 66 cents.

Coffee.—Prices remained relatively unchanged during January, and were (per picul):—Sourabaya $13.12 to $14.12; Palembang $10.25 to $10.94.

Prices in Singapore of other varieties of coffee were as follows (per picul):—Liberian $14; Excelsa $9, improving to $10 but closing at $9; Robusta $7 rising to $8, falling to $7 in the second half of the month.

Spices.

Arecanuts.—The range of Singapore average prices per picul during January was as follows:—Splits $5.10 to $7.65; Red Whole $6 to $9.25; Sliced $5.19 to $6.31.

The averages of the Singapore Chamber of Commerce quotations per picul were:—Best $7.80, Medium $7.35, Mixed $7.05.

Pepper.—The price of Singapore Black improved by 25 cents per picul at the close to average $8.05 for the month. Singapore White and Muntok White were unchanged at $13.50 and $14 per picul respectively.

Nutmegs.—The Singapore market weakened at the close of the month; the average price for 110's and 80's was $41.40 per picul as compared with $41 in December.

Mace.—Prices fell again in the second half of January and averages per picul for the month were Siouw $98, Amboina $82, as compared with $105 and $86.50 in December.

Cloves.—Quotations remained nominal at $40 per picul for both Zanzibar and Amboina.

Cardamoms.—Green cardamoms were quoted in the Ceylon Chamber of Commerce reports for January at Rs. 1.20 to Rs. 1.50, closing at Rs. 1.15 to Rs. 1.52 per lb.

Miscellaneous.

Derris (Tuba Root).—Lack of buying interest in overseas markets weakened prices still further. Roots sold on rotenone content averaged $25 per picul, and on ether basis $15, as compared with $26 and $16 respectively in December.

Gambier.—Block fell from $8 to $7.75 per picul at the close, averaging $7.90 for the month, while No. 1 Cube improved to $16 per picul at the close, averaging $15.60. The December average prices were $8 and $15.50 per picul respectively.

Tapioca.—Seed Pearl and Medium Pearl continued unchanged at $4.80 and $5.20 per picul respectively, while Flake Fair weakened slightly in the second half of the month to $4.25, but recovered to close at $4.50, with an average of $4.45 per picul, as compared with $4.50 in December.

Sago.—Pearl, Small Fair, was quoted throughout the month at $4.25 per picul as compared with an average price of $4.11 in December. Flour, Sarawak Fair, averaged $2.44 per picul as compared with $2.46 in the previous month.

Tobacco.—The range of prices per picul for dried leaf was:—1st quality $27.35 to $48, 2nd quality $16.50 to $42, 3rd quality $8 to $34. Prices of prepared tobacco were:—Kelantan $95; $80; $60; Negri Sembilan $62; $58; $45. In Johore Java tobacco was quoted at $40 to $140 per picul.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports and certain coffee prices are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for imported coffee and arecanuts by the Lianqui Trading Company of Singapore, and derris prices by Messrs. Kohyei & Co., Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and fourpence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57 Trafalgar Square, London, W.C. 2

GENERAL RICE SUMMARY*

December, 1937.

Malaya.—Imports of foreign rice during December were 61,274 tons† and exports 19,914 tons, net imports being 41,360 tons as compared with 45,063 tons in 1936. Net imports for the year 1937 totalled 573,063 tons as compared with 533,795 tons in 1936.¶

Of the imports during December, 48 per cent. were consigned to Singapore, 18 per cent. to Penang, 9 per cent. to Malacca, 17 per cent. to the Federated Malay States, and 8 per cent. to the Unfederated Malay States. The foreign imports by countries of origin were as follows (in tons, percentages in brackets):—Siam 38,071 (62.1), Burma 19,816 (32.3), French Indo-China 2,745 (4.5), other countries 642 (1.1).

Of the exports during December, 60 per cent. were consigned to the Netherlands Indies, and 40 per cent. to other countries. The various kinds of rice exported were as follows (in tons, percentages in brackets):—Siam 16,437 (82.5), Burma 2,557 (12.9), French Indo-China 871 (4.4), parboiled 26 (0.1), local production 23 (0.1).

India and Burma.—Foreign exports during January to November totalled 675,000 tons as compared with 1,246,000 tons in 1936, a decrease of 45.8 per cent. Of these exports 3.9 per cent. were to the United Kingdom, 5.6 per cent. to the Continent of Europe, 29 per cent. to Ceylon, 21 per cent. to the Straits Settlements and the Far East, 40.5 per cent. to other countries. The corresponding 1936 percentages were 3.7, 15.1, 29.8, 22.1 and 29.3.

According to the second rice forecast (*Indian Trade Journal,* 30th December 1937) for the 1937-38 season for All-India, the area under rice is estimated at 68,807,000 acres, an increase of 1 per cent. over the 1936-37 season. The condition of the crop is, on the whole, good.

According to the third forecast of the rice crop in Burma for the season 1937-38, the area likely to mature is estimated at 12,517,200 acres, an increase of 409,300 acres, or 3.4 per cent. as compared with the final figures for the last season.

The district reports indicate that the yield in both Lower and Upper Burma will be distinctly better than last season in most districts, and but for the untimely rain in December the crop would have undoubtedly been a good one. Both the sown and matured areas are notably higher than both the actuals and the corresponding estimate of last season. It is at present anticipated that the condition figure for Lower Burma will be 7 points higher than last season, and for Upper

* Abridged from the Rice Summary for December 1937 compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† Ton = long ton (2,240 lbs.)

¶ It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1936.

Burma 4 points higher. The exportable surplus is at present estimated at 3,450,000 tons of rice and rice products, which may be taken as equivalent to 4,662,000 tons of padi.

Siam.—Exports of rice and rice products from Bangkok during October and November were respectively 57,668 and 72,378 tons. The cumulative total for the year was 850,448 tons as compared with 1,503,385 tons in 1936.

According to the first forecast of the rice crop of Siam for the season 1937-38, received from His Majesty's Consul at Bangkok, the total planted area is estimated at 8,200,000 acres, and the area damaged at 920,000 acres. The total yield is calculated at 4,658,333 tons of padi. The surplus available for export, including carry-over from the previous year, is estimated by the Department of Commerce at 2,113,095 tons of padi, equivalent to 1,583,333 tons of rice and rice products.

Japan.—The latest information available was published in the October Summary.

French Indo-China.—Entries of padi into Cholon from the 1st January to the 15th December totalled 1,352,955 tons, as compared with 1,455,046 tons in 1936, a decrease of 7 per cent. Exports of rice during the same period were 1,471,190 tons as compared with 1,664,442 tons in 1936, a decrease of 11.6 per cent.

The Netherlands Indies.—The latest information available was published in the October Summary.

Ceylon.—Imports of rice for the year 1937 were 515,932 tons as compared with 520,939 tons in 1936, a decrease of 1 per cent.

Of the 1937 imports 17.2 per cent. were from British India, 70.2 per cent. from Burma, 0.6 per cent. from the Straits Settlements and 12 per cent. from other countries. The corresponding 1936 percentages were 14.1, 63.2, 0.4 and 22.3.

Europe and America.—Shipments from the East to Europe from the 1st January to the 2nd December totalled 1,058,783 tons as compared with 1,262,461 tons in 1936, a decrease of 16.1 per cent. Of the 1937 shipments 40.2 per cent. were from Burma, 53.8 per cent. from Saigon, 4.4 per cent. from Siam, and 1.6 per cent. from Bengal. The corresponding percentages for 1936 were 23.9, 66.1, 9.3 and 0.7.

Shipments to the Levant from 1st January to 4th November aggregated 16,218 tons as against 13,541 tons in 1936, an increase of 19.8 per cent. Shipments to Cuba, West Indies and America from 1st January to 22nd November totalled 218,207 tons as compared with 235,657 tons in 1936, a decrease of 7.4 per cent.

MALAYAN AGRICULTURAL EXPORTS, DECEMBER, 1937.

PRODUCT.	Net Exports in Tons			
	Year 1936	Year 1937	December, 1936	December, 1937
Arecanuts ...	26,548	30,083	1,602	3,078
Coconuts fresh † ...	114,314†	95,223†	6,821†	8,569†
Coconut oil ...	46,507	39,764	3,352	3,660
Copra ...	76,681	75,593	7,099	9,647
Gambier, all kinds ...	2,188	1,965	176	76
Copra cake § ...	20,438§	14,901§	2,317§	734§
Palm kernels ...	4,964	7,312	290	495
Palm oil ...	29,296	42,788	2,650	3,236
Pineapples canned ...	76,403	80,504	5,503	5,103
Rubber ¶ ...	365,005¶	503,127¶	32,944¶	50,212¶
Sago,—flour ...	6,180	15,477	406	2,002
,, —pearl ...	3,319	3,760	272	253
,, —raw ...	7,484*	8,256*	616*	673*
Tapioca,—flake ...	1,535	1,058	119	51
,, —flour ...	2,418*	2,391*	462*	288*
,, —pearl ...	17,797	17,173	1,765	1,682
Tuba root ...	599	570	34	21

† hundreds in number. * net imports. ¶ production. § gross exports.

MALAYAN PRODUCTION OF PALM OIL AND KERNELS

(In long tons, as declared by Estates)

Month 1937	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S.
January ...	1,984.8	865.0	360.4	156.0
February ...	1,759.6	1,851.8	323.6	308.7
March ...	1,798.4	1,473.4	358.7	256.1
April ...	1,573.1	1,237.2	308.0	226.0
May ...	1,587.6	1,285.2	257.8	186.4
June ...	1,671.8	1,611.7	288.9	252.5
July ...	2,651.0	1,860.5	411.6	269.6
August ...	3,767.7	1,762.2	616.8	274.0
September ...	3,179.5	1,492.5	621.6	247.1
October ...	3,037.6	1,393.9	569.1	216.1
November ...	2,419.8	1,448.8	455.9	176.7
December ...	2,302.6	1,650.6	522.3	242.2
Total ...	27,733.5	17,932.8	5,094.7	2,811.4
Total 1936	23,081.2	8,812.3	3,791.0	1,340.7

MALAYAN RUBBER STATISTICS

Acreages of Tappable Rubber actually Tapped and not Tapped on Estates of 100 Acres and over, for the Month ending 31st December, 1937.

State or Territory	Estimated Acreages of Tappable Rubber	Actual area tapped during the month Acreage	Percentage of (3) to (2)	Acreages of Tappable Rubber not Tapped: Estates which have entirely ceased tapping — Acreage	Percentage of (5) to (2)	Estates which have partly ceased tapping (a) — Acreage	Percentage of (7) to (2)	Area of Tappable Rubber never been tapped — Acreage	Percentage of (9) to (2)	Total area not tapped (5) + (7)	Percentage of (11) to (2)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Straits Settlements :—											
Province Wellesley ...	43,746	28,179	64.4	—	—	15,567	35.6	416	1.0	15,567	35.6
Malacca ...	122,875	86,347	70.3	753	0.6	35,775	29.1	2,363	1.9	36,528	29.7
Penang Island ...	2,512	1,486	59.2	258	10.2	768	30.6	45	1.8	1,026	40.8
Singapore Island ...	32,840	22,089	67.3	1,306	4.0	9,445	28.7	125	0.4	10,751	32.7
Total S.S. ...	201,973	138,101	68.4	2,317	1.1	61,555	30.5	2,949	1.5	63,872	31.6
Federated Malay States :—											
Perak ...	290,782	219,412	75.5	1,477	0.5	69,893	24.0	6,576	2.3	71,370	24.5
Selangor ...	331,244	259,018	78.2	1,440	0.4	70,786	21.4	7,278	2.2	72,226	21.8
Negri Sembilan ...	257,772	190,890	74.1	1,651	0.6	65,231	25.3	7,748	3.0	66,882	25.9
Pahang ...	85,296	64,123	75.2	2,274	2.7	18,899	22.1	8,357	9.8	21,173	24.8
Total F.M.S. ...	965,094	733,443	76.0	6,842	0.7	224,809	23.3	29,959	3.1	231,651	24.0
Unfederated Malay States :—											
Johore ...	473,865	361,261	76.2	3,397	0.7	109,207	23.1	32,097	6.8	112,604	23.8
Kedah ...	204,782	156,661	76.5	2,997	1.5	45,124	22.0	5,755	2.8	48,121	23.5
Kelantan ...	28,899	21,899	75.8	273	0.9	6,727	23.3	2,775	9.6	7,000	24.2
Trengganu (b) ...	4,817	3,172	65.9	—	—	1,645	34.1	100	2.1	1,645	34.1
Perlis ...	1,347	800	59.4	—	—	547	40.6	94	7.0	547	40.6
Brunei ...	5,285	3,686	69.7	1,105	20.9	494	9.4	709	13.4	1,599	30.3
Total U.M.S. ...	718,995	547,479	76.1	7,772	1.1	163,744	22.8	41,530	5.8	171,516	23.9
Total Malaya ...	1,886,062	1,419,023	75.2	16,931	0.9	450,108	23.9	74,438	3.9	467,039	24.8

Notes :—(*a*) Area out of tapping on estates which have partly ceased tapping refers to areas definitely being rested and includes areas rested under rotational systems, but excludes areas on any tapping round in respect of Perlis only.
(*b*) Registered companies only.
(*c*) Rendered quarterly.

MALAYAN RUBBER STATISTICS — TABLE I

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF DECEMBER, 1937, IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month			Consumption 3	
								during the month		Jan. to Dec. 1937		during the month		Jan. to Dec. 1937						
	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to Dec. 1937	during the month	Jan. to Dec. 1937	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to Dec. 1937
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
MALAY STATES :—																				
Federated Malay States ...	...	9,879	14,976	15,693	166,255	8,989	91,134	Nil	Nil	Nil	Nil	16,720	9,651	183,818	68,484	...	9,717	13,430	19	190
Johore ...	...	2,673	5,231	6,737	71,833	5,942	51,575	Nil	29	Nil	2,407	3,894	7,084	41,882	81,165	...	4,795	4,839	...	...
Kedah ...	...	516	3,888	4,077	41,174	1,624	15,622	Nil	Nil	Nil	Nil	2,710	3,266	26,198	30,387	...	586	3,543	...	...
Perlis ...	...	16	15	20	189	38	310	Nil	Nil	Nil	Nil	Nil	64	Nil	496	...	6	19	...	...
Kelantan ...	...	561	332	249	4,343	1,371	10,260	Nil	Nil	Nil	Nil	285	1,142	3,801	10,200	...	884	202	...	...
Trengganu ...	...	55	50	259	3,561	130	1,782	Nil	Nil	Nil	Nil	Nil	389	Nil	5,343	...	55	50	...	...
Brunei ...	...	31	70	62	743	124	1,056	...	...	...	...	...	212	...	1,770	...	Nil	75	...	...
Total Malay States	...	13,731	24,562	27,097	288,098	18,218	171,739	Nil	29	Nil	2,407	23,609	21,808	255,699	197,845	...	16,043	22,158	19	190
S. SETTLEMENTS :—																				
Malacca ...	...	2,171	1,272	1,618	17,313	1,197	9,786	Nil		Nil		3,766		38,229		...	2,217	1,311	...	...
Province Wellesley	...	2,976	828	625	6,733	562	3,707	Nil		Nil		8,113		101,777		...	2,943	809	...	...
Penang ...	1,868	5,137	23	23	242	280	1,616	2,612	19,211	34,523	192,283		Nil		Nil	4,299	5,842	8	...	...
Singapore ...	5,791	26,907	244	212	2,272	342	1,374	11,263		178,232		21,303		285,933		7,911	26,762	202	31	386
Labuan ...	...	47	Nil	Nil	Nil	38	247	74		691		Nil		Nil		...	43	Nil	...	...
Total Straits Settlements ...	7,659	36,338	2,367	2,478	26,560	2,419	16,730	13,949	19,211	213,446	192,283	33,182	Nil	425,939	Nil	12,210	37,807	2,330	31	386
Total Malaya ...	7,659	50,069	26,929	29,575	314,658	20,637	188,469	13,949	19,240	213,446	194,690	56,791	21,808	681,638	197,845	12,210	53,850	24,488	50	576

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Kedah
22	23	24	25	26	27	28
DRY RUBBER	8,801	25,594	5,571	4,875	4,075	211
WET RUBBER	916	1,068	271	328	720	375
TOTAL ...	9,717	26,762	5,842	5,203	4,795	586

TABLE III
FOREIGN EXPORTS

PORTS	For month	Jan. to Dec. 1937
29	30	31
Singapore ...	36,847	457,240
Penang ...	13,074	156,613
Port Swettenham	6,514	64,886
Malacca ...	356	2,899
MALAYA ...	56,791	681,638

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	Jan. to Dec. 1937
32	33	34
Malay States ...	45,271	†450,627
Straits Settlements	4,187	†42,127
MALAYA ...	49,458	492,754

†Amended.

Notes:—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
2. The production of estates of less than 100 acres is estimated from the formula: Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [20] − [2] − [3] − [4] − [5] − [9] − [10]. For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by cess paid.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Columns (33) and (34) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by cess paid.
5. All statements are brought up to date monthly, and any inaccuracies that may be disclosed are corrected in the totals; the latest publication therefore, is always the most reliable.
6. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S and F.M.S., at Singapore on 22nd January, 1938.

METEOROLOGICAL SUMMARY, MALAYA, DECEMBER, 1937.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of			Absolute Extremes									Number of days.							
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet	Total.		Most in a day. Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more	Total.	Daily Mean.	Per cent.
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						hrs.	hrs.	
Railway Hill, Kuala Lumpur, Selangor ...	88.2	72.0	80.1	93	69	80	74	82.7	83.9	8.08	205.2	2.01	22	16	2		7	134.20	4.33	36
Bukit Jeram, Selangor ...	86.3	72.1	79.2	90	70	81	74	82.7	85.2	6.96	176.8	1.86	17	13		3	2	168.30	5.43	45
Sitiawan, Perak ...	86.9	72.5	79.7	91	70	77	75	82.8	84.0	11.32	287.5	2.19	18	16	2	1		148.85	4.80	41
Temerloh, Pahang ...	84.9	72.0	78.5	90	70	76	73	83.3	85.3	5.17	131.3	0.74	22	17		4		114.00	3.68	31
Kuala Lipis, Pahang ...	84.2	71.0	77.6	91	69	75	73	81.5	83.4	11.13	282.7	2.23	26	21	1	8		103.80	3.35	28
Kuala Pahang, Pahang ...	82.0	73.4	77.7	85	71	75	75	80.2	83.3	30.97	786.6	5.44	21	20				112.60	3.63	31
Kallang Aerodrome, S'pore ...	85.3	74.2	79.7	89	71	78	76	80.8	82.5	10.31	261.9	1.87	24	21	7			120.45	3.89	32
Bayan Lepas Aerodrome Penang ...	86.2	73.5	79.9	91	71	77	75	82.3	83.5	1.51	38.4	0.35	14	7	1			155.60	5.02	42
Bukit China, Malacca ...	84.8	73.0	78.9	88	71	79	75	80.7	82.8	11.19	284.2	2.49	19	14	3		1	147.35	4.75	39
Kluang, Johore ...	85.7	71.2	78.5	91	68	74	73	80.4	81.9	11.46	291.1	2.07	21	19	3	6		122.30	3.95	32
Bukit Lalang, Mersing, Johore	81.8	72.3	77.1	85	70	74	76	79.7	80.7	29.13	739.9	5.01	25	19				137.85	4.45	37
Alor Star, Kedah ...	86.0	72.1	79.1	90	70	75	74	82.1	84.3	5.45	138.4	1.56	18	16	1			145.10	4.68	39
Kota Bahru, Kelantan ...	81.8	71.9	76.9	87	69	74	75	79.3	83.0	45.35	1151.9	8.35	22	20		3		105.75	3.41	29
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft.	81.2	72.0	76.6	85	70	75	74	78.7	81.2	57.61	1463.3	9.28	23	22			3	97.40	3.14	26
Kuala Trengganu, Trengganu	68.9	61.3	65.1	74	58	62	63	69.9	71.1	9.93	252.2	2.47	29	24	4	23		75.10	2.42	20
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	70.3	57.5	63.9	74	52	67	61	69.3	69.7	7.37	187.2	1.55	27	20		2	1	82.70	2.67	23
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	70.1	58.8	64.9	75	56	65	61			6.85	174.0	1.53	26	19		1	1	83.95	2.71	23

Compiled from Returns supplied by the Meteorological Branch, Malaya.